



Geel 2000 Language Schools Math Department First Term

Prep. 3



2025/2026

Name : - - - - -

Class: - - - - -

Unit One

Relations and functions

- Lesson one : Cartesian product
- Lesson two : Cartesian product of the infinite sets and its graphical representation
- Lesson three: relation - function (mapping)
- Lesson four : The symbolic representation of the function - polynomial functions
- Lesson five : The study of some polynomial functions

1) Find the values of a and b in each of the following if :

1. $(a, b) = (\sqrt{25}, \sqrt[3]{27})$
2. $(a^2, 1) = (36, b^5)$
3. $(2a, 7) = (2b + 1, a)$

2) If $X = \{5\}$, $Y = \{2, 7\}$

1. $X \times Y$ and represent it by an arrow diagram.
2. $X \times Y$ and represent it by Cartesian diagram.

3) If $X = \{3, 4, 8\}$ Find $X \times X$ and represent it :

- By an arrow diagram.
- By Cartesian diagram.

4) Complete the following:

1. If $X = \{1, 2, 3\}$, $Y = \{4\}$, then $X \times Y = \dots\dots\dots$
2. If $X = \{5, 6\}$, $Y = \{a\}$, then $Y \times X = \dots\dots\dots$
3. If $X = \{1, 2\}$, then $X \times \emptyset = \dots\dots\dots$
4. $\{2, 3\} \times \{4, 5\} = \dots\dots\dots$
5. $\{0\} \times \{2, 3\} = \dots\dots\dots$
6. If $(1, 5) \in X \times Y$ then $1 \in \dots\dots\dots$, $5 \in \dots\dots\dots$
7. $\{(5, 7)\} = \dots\dots\dots \times \dots\dots\dots$

5) Choose the correct answer from those given :

1. If $n(X^2) = 4$, $n(X \times Y) = 8$, then $n(Y^2) = \dots\dots\dots$
(a) 1 (b) 4 (c) 16 (d) 64
2. If $X = \{3, 4\}$, then $n(X \times \emptyset) = \dots\dots\dots$
(a) Zero (b) 1 (c) 2 (d) $\emptyset$
3. If $(3, 5) \in \{3, 6\} \times \{x, 8\}$, then $x = \dots\dots\dots$
(a) 8 (b) 6 (c) 5 (d) 3

1) Choose the correct answer from those given :

1. The point (..... ,) lies on the second quadrant.

- (a) (3, 2) (b) (-2 , 3) (c) (- 3 , -2) (d) (2 , -3)

2. If the point (x , 2) lies on y - axis, then x =

- (a) Zero (b) 1 (c) 2 (d) 3

3. If the point (-4 , y) lies on the x - axis , then $2y - 1 = \dots\dots\dots$

- (a) - 1 (b) 1 (c) - 8 (d) - 9

4. If the point (a, b) lies on the fourth quadrant , then a.bzero

- (a) = (b) > (c) < (d) $\geq$

5. If the point (2a , 3b) $\in \overrightarrow{xx}$, then $\frac{b}{a} = \dots\dots\dots$

- (a) Zero (b) $\frac{2}{3}$ (c) 2 (d) 3

6. If the point (x - 2 , x - 4) lies on the fourth quadrant , then x =

where $x \in \mathbf{Z}$ (a) Zero (b) 2 (c) 3 (d) 4

2) If A (-2 , 0) , B (-2 , 3) , C (2 , 3) identify on the perpendicular square net R^2 the points A, B , C and find the area of ΔABC

1) Choose the correct answer from those given :

1. If f is a function from the set X to the set Y , then : X is called.....

- (a) the range of the function f (b) the domain of the function f
(c) the codomain of the function f (d) the rule of the function f

2. If f is a function from the set X to the set Y , then : Y is called.....

- (a) the range of the function (b) the domain of the function
(c) the codomain of the function (d) the rule of the function

3. If R is a function where $R = \{ (1, 3), (2, 5), (4, 7) \}$, then its range is.....

- (a) $\{ 1, 2, 4 \}$ (b) $\{ 2, 4, 7 \}$ (c) $\{ 3, 5, 7 \}$ (d) $\{ 1, 3, 5 \}$

4. If R is a function from X to Y where $X = \{ 2, 4, 5 \}$, $Y = \{ 6, 7 \}$ and

$R = \{ (2, 6), (a, 6), (5, 6) \}$, then $a =$

- (a) 4 (b) 5 (c) 12 (d) 6
-

2) If $X = \{ 3, 4, 5 \}$, $Y = \{ 4, 6, 8, 10 \}$ and R is a relation from X to Y where " $a R b$ " means " $a = \frac{1}{2} b$ " for each $a \in X, b \in Y$

Write the set of the relation R and show that R is a function, then write its range.

- 3) If $X = \{1, 2, 3\}$, $Y = \{1, 3, 6, 9, 12\}$ and R is a relation from X to Y where " $a R b$ " means " $a = \frac{1}{3} b$ " for each $a \in X, b \in Y$

Write R and show that R is a function, then write its range.

- 4) If $X = \{4, 6, 8, 10\}$, $Y = \{2, 3, 4, 5\}$ and R is a relation from X to Y where " $a R b$ " means " $a = 2b$ " for each $a \in X, b \in Y$

Write R and represent it by an arrow diagram.

- 5) If $X = \{1, 2, 3\}$, $Y = \{1, 2, 4, 6, 9\}$ and R is a relation from X to Y where " $a R b$ " means " $a^2 = b$ " for each $a \in X, b \in Y$

- Write R and represent it by an arrow diagram.
- Is R a function ? Why ?

1) Choose the correct answer from those given :

1. The function f where $f(x) = 6x^7 + 2x^5 - 4x + 1$ is a polynomial function of degree.
(a) First (b) fifth (c) sixth (d) seventh
2. The function f where $f(x) = 2x - 3x^4 + 1$ is a polynomial function of degree.
(a) First (b) second (c) third (d) fourth
3. The function $f: f(x) = (x - 5)^3$ is a polynomial function of degree.
(a) Zero (b) second (c) third (d) fourth
4. The function $f: f(x) = x(x - 2x^2)$ is a polynomial of the degree.
(a) first (b) second (c) third (d) fourth
5. The function $f: f(x) = x^2(x - 3)^2$ is a polynomial of the degree.
(a) first (b) second (c) third (d) fourth
6. If: $f(x) = x^3 - 1$, then $f(1) =$
(a) Zero (b) 2 (c) -2 (d) 1
7. If: $f(x) = ax + 6$, $f(2) = 2$, then $a =$
(a) 2 (b) -2 (c) 4 (d) 6
8. If: $X = \{2, 4, 6\}$, $n(Y) = 4$ and the function $f: X \longrightarrow Y$, $f(x) = x^2 - 1$, then Y may equal
(a) $\{3, 7, 13\}$ (b) $\{3, 15, 25, 45\}$
(c) $\{3, 15, 35\}$ (d) $\{3, 15, 25, 35\}$

2) Which of the following functions represents a polynomial function :

1. $f: f(x) = 2x - 5$

2. $f: f(x) = 3$

3. $f: f(x) = x + \frac{1}{x}$

4. $f: f(x) = x^3 + x^2 + 3$

5. $f: f(x) = x^2 + \sqrt{x} + 8$

6. $f: f(x) = x \left(x + \frac{1}{x} - 2 \right)$

7. $f: f(x) = \sqrt[3]{x} + 8$

8. $f: f(x) = x(x^2 + x^{-2} - 4)$

3) If : $f(x) = 2x - 1$, prove that : $f(2) - 3f(1) = \text{Zero}$

1) Complete the following :

1. The function $f: \mathbf{R} \longrightarrow \mathbf{R}$
where $f(x) = 5$ is represented by a straight line parallel to
and intersects y - axis at the point
2. The x - axis is the graphical representation of the function $f: \mathbf{R} \longrightarrow \mathbf{R}$
where $f(x) = \dots\dots\dots$
3. If $f(x) = -3$, then : $f(0) = \dots\dots\dots$ where $f(x) = \dots\dots\dots$
4. If $f(x) = 3$, then $f(5) + f(-5) = \dots\dots\dots$
5. If $f(x) = 5$, then $\frac{f(5)}{f(10)} = \dots\dots\dots$
6. The linear function given by the rule $y = 2x - 1$
is represented graphically by a straight line intersecting the
 y - axis at the point
7. The straight line which represents the function $f: \mathbf{R} \longrightarrow \mathbf{R}$
where $f(x) = 5x - a$ intersects the y - axis at the point $(b, 2)$, then
 $a = \dots\dots\dots$ and $b = \dots\dots\dots$
8. The Curve of the quadratic function has a maximum value if the sign
of the coefficient of x^2 is
and has a minimum value if the sign of the coefficient of x^2 is
9. If the curve of the quadratic function which is defined on $\mathbf{R}$
has a maximum value then this curve is opened
10. The equation of the axis of symmetry of the function $f: f(x) = x^2$ is
11. As representing $f: f(x) = ax^2 + bx + c$, where $a \in \mathbf{R}^*$, then the
 x - coordinate of the vertex of the curve =
12. The point of the vertex of the curve of the function
 $f: f(x) = 2x^2 - 4x + 5$ is
13. If the curve of the function f such that
 $f(x) = x^2 + c$ passing through the point $(0, 2)$, then : $c = \dots\dots\dots$
14. If $(-2, y)$ belongs to the curve of the function $f: f(x) = x^2 + 1$
, then : $y = \dots\dots\dots$

2) *Represent each of the following linear functions graphically and find the point of intersection of the straight line which represents each of them with the coordinate axes, where $x \in \mathbb{R}$:*

1. $f: f(x) = -x$

2. $f: f(x) = 2x - 3$

3) *Represent each of the following functions graphically and from the graph, deduce the coordinate of the vertex of the curve and the equation of the line of symmetry and the maximum or minimum value of the function, where $x \in \mathbb{R}$:*

1. $f: f(x) = x^2 + 1$ taking $x \in [-3, 3]$

2. $f: f(x) = x^2 - 2x$ taking $x \in [-2, 4]$

Unit Two

Ratio, Proportion, direct variation and inverse variation

- Lesson one : Ratio and proportion
- Lesson two : Follow properties of proportion
- Lesson Three : Continued proportion
- Lesson Four : Direct variation and inverse variation

1) Complete the following :

1. The proportion
 2. If a, b, c and d are proportional quantities, then c is called
 3. If the quantities a, b, c , and d are proportional, then : $\frac{a}{b} =$
 4. The fourth proportional for the numbers 4, 12 and 16 is
 5. The second proportional for the numbers 8, 6 and 12 is
 6. If 3, 4, x and 11 are proportional, then : $x =$
 7. If 3, $a-1$, $a+1$ and 5 are proportional, then : $a =$
 8. A sum of money is divided between two persons with the ratio 2 : 3
If the share of the first is L.E 30, then the share of the other is L.E
 9. If $7x = 3y$, then : $\frac{x}{y} =$
 10. If $5a - 4b = 0$, then : $\frac{a}{b} =$
 11. If $\frac{5a-7b}{8a+11b} = 0$, then : $\frac{b}{a} =$
 12. If $9a^2 - 25b^2 = 0$ where $a \in \mathbf{R}^+$ and $b \in \mathbf{R}^+$, then : $\frac{a}{b} =$
 13. If $\frac{x}{y} = \frac{2}{5}$, then : $\frac{2x}{2y} =$
-

2) Find the value of x in each of the following , if :

1. $(2x - 3) : (x - 5) = 1 : 4$
2. $(x^2 - 8) : (2x^2 + 1) = 1 : 3$

3) If $\frac{x+3y}{2x-y} = \frac{3}{4}$, find the ratio $x : y$

4) If $x^2 - 4y^2 = 3xy$, find $x : y$

5) If $3x^2 - 10xy + 7y^2 = 0$, $x \neq y$, find the ratio $x : y$

6) If $\frac{a}{b} = \frac{3}{4}$, then find the value of :

• $\frac{4a+b}{2a-b}$

7) Find the number which is subtracted from each of the following numbers to be proportional 16, 21, 14 and 18.

8) Prove that : a, b, c and d are proportional quantities if :

$$\frac{a}{a-b} = \frac{c}{c-d}$$

1) Complete the following :

1. If $\frac{a}{b} = \frac{c}{d} = \frac{3}{5}$, then : $\frac{a+c}{b+d} = \dots\dots\dots$

2. If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{3}{5}$, then : $\frac{a-2c+e}{b-2d+f} = \dots\dots\dots$

3. If $\frac{x+y}{5} = \frac{y+e}{3} = \frac{e+x}{6}$, then : $\frac{x-e}{2} = \frac{y-x}{\dots\dots\dots}$

4. $\frac{l}{3} = \frac{m}{8} = \frac{l + \frac{1}{2}m}{\dots\dots\dots}$

5. If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$, then : $\frac{5a+3c+\dots\dots\dots}{5b+\dots\dots\dots+4f} = \frac{a}{b}$

2) Choose the correct answer from those given :

1. If $\frac{a}{5} = \frac{b}{7}$, then : $7a - 5b + 3 = \dots\dots\dots$

(a) 3

(b) 7

(c) 5

(d) 2

2. If $\frac{x}{2} = \frac{y}{7} = \frac{2x+y}{a}$, then : $a = \dots\dots\dots$

(a) 9

(b) 11

(c) 16

(d) 5

3) If a, b, c and d are proportional quantities, prove that :

$$\frac{5a+3c}{5b+3d} = \frac{3a-2c}{3b-2d}$$

4) If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$, prove that : $\frac{a+5c}{b+5d} = \frac{c-3e}{d-3f}$

5) If $\frac{a}{4x+y} = \frac{b}{x-4y}$, prove that : $\frac{a+b}{5x-3y} = \frac{a-b}{3x+5y}$

6) If $\frac{a}{2} = \frac{b}{7} = \frac{c}{3}$, find the value of $\frac{a+2b}{b-c}$

1) Find the middle proportion between :

- 3 , 27
- $2 a , 8 a b^2$

2) Find the Third proportion of each of the following :

- 6 , 12

3) If b is the middle proportion between a and c , prove that :

- $\frac{a}{c} = \frac{b^2}{c^2}$

- $\frac{a-b}{b-c} = \frac{a+3b}{3c+b}$

- $\frac{a+b}{b+c} = \frac{a}{c}$

4) If a , b , c and d are in continued proportion , prove that :

$$\bullet \quad \frac{3a+5c}{3b+5d} = \frac{a-4c}{b-4d}$$

$$\bullet \quad \frac{3a-5c}{a-b+c} = \frac{3b-5d}{b-c+d}$$

$$\bullet \quad \frac{\sqrt[3]{5a^3-3c^3}}{\sqrt[3]{5b^3-3d^3}} = \frac{a+c}{b+d}$$

5) If $\frac{x^2-y^2}{y^2} = \frac{y^2-z^2}{z^2}$, prove that : y is the middle proportion between x and z

Where x z is a positive quantity.

1) Complete the following :

1. If $x \propto y$ then : $x = \dots\dots\dots$
2. If $z = \frac{m}{x^2}$ where m is a constant , then $z \propto \dots\dots\dots$
3. If $y \propto x$, then : $\frac{x_1}{x_2} = \frac{\dots\dots\dots}{\dots\dots\dots}$
4. If x varies inversely as y , then : $\frac{y_1}{y_2} = \frac{\dots\dots\dots}{\dots\dots\dots}$
5. If $y = \frac{3}{5} x$, then : $y \propto \dots\dots\dots$
6. If $y \propto \frac{5}{x}$, then : y varies inversely as $\dots\dots\dots$
7. If $x - 2y = 0$, then : $x \propto \dots\dots\dots$
8. If $2xy = 5$, then : $x \propto \dots\dots\dots$
9. If $y \propto x$ and $y = 2$ as $x = 8$, then : $y = \dots\dots\dots$ when $x = 12$
10. If $y \propto \frac{1}{x}$ and $y = 3$ as $x = 20$, then : $y = \dots\dots\dots$ when $x = 12$
11. If $y \propto x$ and $y = 2$ as $x = 4$, then : $y = \dots\dots\dots x$

2) If y varies directly as x and $y = 20$ as $x = 7$

Find : x when $y = 40$

3) If a varies inversely as b and $a = 12$ as $b = 8$, find :

- *The value of a as $b = 1.5$*
- *The value of b as $a = 2$*

4) If $y \propto$ the multiplicative inverse of the expression $\frac{1}{x^2}$, then find the relation between x and y , If $y = 4$ as $x = 3$, then : find the value of y as $x = 9$

5) If $y^2 \propto x^3$, find the relation between x and y where $y = 3$ as $x = 2$

6) If: $\frac{a+b}{3} = \frac{2b+c}{6}$, then prove that : $c \propto a$

7) If : $x^2 y^2 - 6xy + 9 = 0$, then prove that : $y \propto \frac{1}{x}$

Unit Three

Statistics

- Lesson one : Collecting data
- Lesson two : Dispersion

1) Complete the following :

1. The resources of collecting data are and
2. The personal interview is a resource of collecting data.
3. The data of the students that are registered in students affair is a resource of collecting data.
4. Central agency for public mobilization and statistics is a resource of collecting data.
5. Direct observing is a resource of collecting data.
6. The suitable method for examining blood of a patient is a
7. The suitable method for checking the production of a factory is
8. The suitable method to know the population is
9. The suitable method to know the ratio of absence in one of the schools is
10. If the society is divided into illiterates , carries of mediate , intermediate and high qualifications , the chosen sample for making a research is called

2) Choose the correct answer from those given :

1. is a secondary resources of collecting data.

- (a) Personal interview
- (b) Questionnaires
- (c) Data base of the employees
- (d) Observing and measuring

2.is a primary resource of collecting data.

- (a) Central agency for statistics
- (b) Data of the school pupils in the previous year
- (c) Questionnaires
- (d) Data of the employees in one of the companies

3. The method of mass population is suitable for

- (a) searching the formation of the sand of the Western Desert.
- (b) examining the sweetness of water for one of the wells
- (c) finding out the ratio of finding a metal in one of the mines
- (d) getting the number of the students who had the full mark in maths exam in a class

4. Choosing a sample from the society's layers in statistics is called a sample.

- (a) biased
- (b) layer
- (c) international
- (d) cluster

1) Complete the following :

1. Dispersion measurements are and
 2. The simplest measure of the dispersion is
 3. The difference between the greatest value and the smallest value in a set of values is called
 4. The positive square root of the average of squares of deviations of the values from their mean is called
 5. If the standard deviation equals zero , then
 6. The dispersion to an set equally values equals
 7. The mean of the set of the values : 7 , 5 , 9 , 11 and 3 is
 8. The range of the set of the values : 6 , 5 , 9 , 4 and 12 is
 9. If the standard deviation for nine of the values is 3 , then : $\sum (x - \bar{x})^2$
For these values is
-

2) Calculate the standard deviation for the next data :

- 16 , 32 , 5 , 20 , 27

3) The following are the frequency distribution for a number of defective units found in 100 boxes of manufactured units:

Number of defective units	Zero	1	2	3	4	5
Number of boxes	3	16	17	25	20	19

Find the standard deviation of the defective units.

4) The following table represents the daily wages of a set of workers in a factory:

Sets of wages	20 -	30 -	40 -	50 -	60 -	70 -
Number of workers	10	12	8	6	3	1

Find the mean and standard deviation of wages.

Worksheets in Math

Geo. prep (3)

2022/2023

Name:.....

School:.....

Class:.....

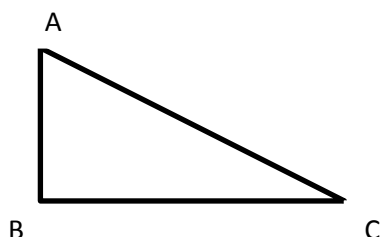
Unit 4 objectives

- 1- Know trigonometrical ratios of acute angle**
- 2- Solve exercises which connected with geometric figures**
- 3- Deal with special angles**

Learn & Think

Trig - Ratios

In the triangle $\triangle ABC$, right in B, $AB = 5$ Cm, $BC = 12$ Cm.
Find length of AC?



Sol :-

$$AC = \sqrt{144 + 25} = 13 \text{ cm.}$$

Also write rules of

$$\sin A = \dots \frac{BC}{AC} \dots$$

$$\sin C = \dots \frac{AB}{AC} \dots$$

$$\cos A = \dots \frac{AB}{AC} \dots$$

$$\cos C = \dots$$

$$\tan A = \dots$$

$$\tan C = \dots$$

Can you deduce relations between each 2 complementary angles?

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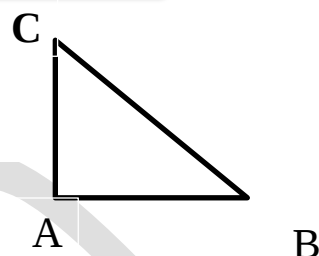
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Think & Answer

Evaluation

1- In $\triangle ABC$ which is right at A

Prove that : $\cos(C) \cos(B) - \sin(C) \sin(B) = 0$



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2- ABCD is rectangle AB = 15 cm. AC = 25 cm.

Find : $\tan(ACB)$ & also find area of rectangle

.....

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.....

.....

.....

Remember that :

$$1 - \sin = \frac{\text{opposite}}{\text{hypotenuse.}}$$

$$2 - \cos = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$3 - \tan = \frac{\text{opposite}}{\text{adjacent}}$$

**Learn &
Think**

1- Find the value of

1- $\sin(45^\circ) - \cos(45^\circ) = 0$

.....
.....

2- $\sin(30^\circ) + \cos(60^\circ) - \tan(45^\circ)$

.....
.....

2 - prove that :

1- $\tan^2 60 - \tan^2 45 = \sin^2 60 + \cos^2 60 + 2 \sin 30$

2- $\cos 60 = 2\cos^2 30 - 1$

.....
.....
.....
.....
.....

1- prove that:

1- $\cos 60 = 2\cos^2 30 - 1$

2- $\tan^2 60 - \tan^2 45 = \sin^2 60 + \cos^2 60 + 2\sin 30$

.....

.....

.....

.....

2- Find the value of X where

1- $4X = \cos^2 30 \tan^2 30 \tan^2 45$

2- $3 \tan X - 4 \sin^2 30 = 8 \cos^2 60$

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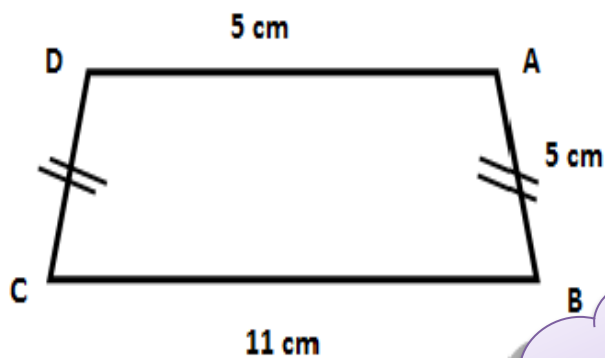
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In the opposite figure Find

1. $\sin^2 C + \cos^2 B$

2. $m < A$

3. The area of Trapezium



Think & Design

Homework

1- prove that

1. $\tan 60^\circ = \frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$

2. $\cos^2 60^\circ = 5 \sin^2 30^\circ - \tan^2 45^\circ$

Q bank on unit 4

- Complete :

1) $\sin(30) + \cos(60) - \tan(45) = \dots\dots\dots$

2) $\sin^2(45) + \cos^2(45) = \dots\dots\dots$

3) $\tan(45) \times \sin(30) = \dots\dots\dots$

4) $4\cos(30)\tan(60) = \dots\dots\dots$

5) $\sin(30)\cos(60) + \sin^2(60) = \dots\dots\dots$

- Without using the calculator , Prove that :

1) $\sin(60) = 2\sin(30)\cos(30)$

2) $\cos(60) = 2\cos^2(30) - 1$

3) $2\cos^2(30) - 1 = 1 - 2\sin^2(30)$

4) $\tan(60) = \frac{2\tan(30)}{1-\tan^2(30)}$

- Choose the correct answer :

1) If $\cos(X) = \frac{1}{2}$, X is acute angle ,then $M(\hat{X}) = \dots\dots\dots^\circ$

(90 , 60 , 45 , 30)

2) If $\sin(X) = \frac{1}{2}$, X is acute angle ,then $M(\hat{X}) = \dots\dots\dots^\circ$

(90 , 60 , 45 , 30)

3) If $\tan(X) = \frac{1}{\sqrt{3}}$, X is acute angle , then $\tan(2X) = \dots\dots\dots$

(3 , 1 , $\sqrt{3}$, $\sqrt{2}$)

4) If $2\sin(X) = \tan(60)$, X is acute angle , then $M(\hat{X}) = \dots\dots\dots^\circ$

(30 , 45 , 60 , 90)

- Find the value of X in the following :

1) $X \sin^2(45) = \tan^2(60)$

2) $X \sin(30) \cos^2(45) = \sin^2(60)$

3) $\sin(X) = \sin(60)\cos(30) - \cos(60)\sin(30)$

4) $2\sin(X) = \sin(30)\cos(60) + \cos(30)\sin(60)$

- If $\tan(X) = \frac{1}{\sqrt{3}}$, X is acute angle , Find the value of :

$\sin(X) \tan\left(\frac{3X}{2}\right) + \cos(2X) .$

- $\triangle ABC$ right angle triangle in B , $M(\hat{A}) = 2 M(\hat{C})$,

Find the value of : $\cos^2(A) + \tan^2(C) .$

- ABCD rectangle , AB = 5 Cm , AC = 15 Cm , Find :

(1) $M(\angle ACB) .$

(2) the area of the rectangle ABCD .

- ABCD isosceles trapezoid , AB = AD = DC = 5 Cm , BC = 11 Cm .

Find 1) $M(\hat{B})$

2) $M(\hat{A})$

3) the area of ABCD .

- $\triangle ABC$ Equilateral triangle , AB = AC = 7 Cm , BC = 10 Cm

Find 1) $M(\hat{B})$

2) the area of $\triangle ABC$.

Test on unit four

- Choose the correct answer :

1) If $\cos(2X) = \frac{1}{2}$, then $m(\hat{X}) = \dots\dots\dots$

(a)15 (b)30 (c)45 (d)60

2) If $\triangle ABC$ right triangle in B , then $\cos(A) + \cos(C) = \dots\dots\dots$

(a) $2\cos(C)$ (b) $2\sin(B)$ (c) $2\sin(A)$ (d) $2\cos(A)$

3) $\sin(45) \cos(45) = \dots\dots\dots$

(a)2 (b)1 (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

4) The triangle ABC right angle triangle in B , $AB = \frac{1}{2} AC$, then $\cos(A) = \dots\dots\dots$

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{3}}$

5) The sum of the supplementary angles = $\dots\dots\dots$

(a)360 (b)270 (c)180 (d)90

6) In $\triangle ABC$, $\sin(A) = \cos(B)$, then $\triangle ABC$ is $\dots\dots\dots$

(a)obtuse angle triangle . (b)acute angles triangle .

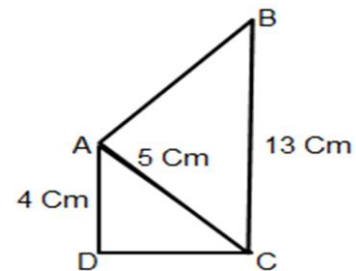
(c)right angle triangle . (d)obtuse angle triangle and isosceles .

- If $\tan(X) = 4\sin(30)\cos(30)$, Find $M(\hat{X})$ by degree .
- Without using calculator , Find the value of $\frac{\cos^2(60) + \cos^2(30) + \tan^2(45)}{\sin(60)\tan(60) + \sin(30)}$

- In the corresponding figure , Find the value of .

1) $\tan(\hat{ABC}) + \tan(\hat{ACD})$

2) $\sin(\hat{B})\cos(\hat{CAD}) + \cos(\hat{B})\sin(\hat{CAD})$



- In $\triangle ABC$ right in B , $AC = 5$ cm , $BC = 4$ cm .

Find the value of $\sin(C)\cos(A) + \cos(C) + \sin(A)$

Unit 5 objectives

- 1- Know rules of distance & coordinates of midpoint & slope**
- 2- Solve exercises on equation of straight line**
- 3- Connect with algebra**

Learn & Think

1- If $A(2, -4)$, $B(-1, 0)$ find length of $\overline{AB}$

$$AB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} = 5 \text{ length units.}$$

2- Represent graphically & determine type of the figure if

$A(2, 4)$, $B(-3, 0)$, $C(-7, 5)$, $D(-2, 9)$?

Think & Answer

1. If $A(-1, -1)$, $B(2, 3)$, $C(6, 0)$ prove that $\triangle ABC$ is right & find its area

2- prove that $A(3, -1)$ $B(-4, 6)$ & $C(2, -2)$ on same circle whose center is $(-1, 2)$?

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.....

3- If the distance between $(-2, 3)$, $(a, 7)$ is 5 | u. find a ?

.....

.....

4-prove that $A(3, -1)$ $B(-4, 6)$ & $C(2, -2)$ on same circle whose center is $(-1, 2)$?

.....

.....

5- If the distance between $(-2, 3)$, $(a, 7)$ is 5 find a ?

.....

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6- Determine type of triangle ABC with respect to its angles

if $A(5, 3), B(3, -2), C(-2, -4)$?

.....

.....

7- If $A(3, 3), B(0, 3), C(0, 0)$ prove that ABC can be $\triangle$

.....

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.....

Remember that

Distance between 2 points is the length between them in shortest way
(perpendicular distance)

Lesson : coordinates of midpoint

The main ideas :

Midpoint = $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right)$

1- If A (7 , - 4) , B (- 1 , 0) the coordinates of mid of $\overline{AB}$

Mid = $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right) = (3 , -2)$

2- if A (3, 5) B (X , 1) & C (-1 , Y) If C is mid of AB find X & Y ?

Think &
Answer

Evaluation

1- If C (2 , 0) is midpoint of $\overline{AB}$, A (3 , 1) , find B ?

2-Prove that $A(2, 4)$, $B(-3, 0)$, $C(-7, 5)$, $D(-2, 9)$ are coordinates of Vertices of parallelogram ?

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3- If $A(3, 2)$, $B(4, -3)$, $C(-1, -2)$ are non collinear points , find d which makes ABCD is rhombus & find it's area ?

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4- If $A(-1, -1)$, $B(2, 3)$, $C(6, 0)$ prove that $\triangle ABC$ is right then find the Coordinates of vertex D which makes ABCD rectangle & find its area ?

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Remember that :

Properties of parallelogram

1-

2-

3-

4-

Homework

1. Prove that $\triangle ABC$ is obtuse angled if $A(5, 3)$, $B(3, -2)$, $C(-2, -4)$

Find coordinates of vertex D which makes $ABCD$ is parallelogram ?

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**Think &
Design**

Activity :

...

On lattice represent $A(-2, 5)$ $B(2, -1)$ then find coordinates of the midpoint ?

...

Lesson: the slope

The main ideas :

Rules :-

$$\text{Slope}(m) = \tan \theta$$

Where angle θ is the angle which the straight line makes with the positive direction of X -axis

$$\text{Slope}(m) = \frac{y_1 - y_2}{x_1 - x_2} \quad \& \text{ the general equation :}$$

$$\text{Equation } y = mX + c$$

Slope $\leftarrow$

$\rightarrow$ part of $\overleftrightarrow{yy}$ (c is the intercepted part from Y -axis)

Learn & Think

Board summery

1- Find equation of straight line whose slope = 3 & cuts 5 units from positive direction of Y axis ?

$$Y = 3X + 5$$

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2- Find equation of straight line which passes through $(2, 3)$, $(-1, 4)$?

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**Think &
Answer**

Evaluation

1- Straight line whose equation $2x - 3y + 6 = 0$ Find the slope & the intercepted part of Y axis ?

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2- Straight line whose slope = 2 & cuts 3 units in negative direction of Y axis find its equation?

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3 - Find equation of straight line which passed through $(3, 1)$ & the perpendicular to straight whose equation $6x - 2y = 7$?

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Homework

1- Find equation of the axis of symmetry of $\overline{AB}$ A (3 , 2) & B (- 1 , 1) ?

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Q. Bank unit five

- Choose the correct answer :

1) The midpoint of $\overline{AB}$, such $A(3,1)$, $B(-1,3)$ is

($(4,-2)$, $(2,-1)$, $(2,4)$, $(-1,2)$)

2) If $\overrightarrow{AB} \parallel \overrightarrow{CD}$ and the slope of $\overrightarrow{AB} = -2$, then the slope of $\overrightarrow{CD} = \dots\dots\dots$

(-2 , $\frac{-1}{2}$, $\frac{1}{2}$, unknown)

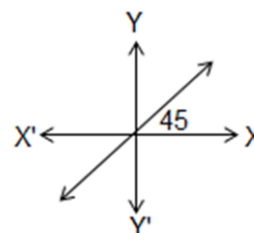
3) The distance between the two points $(2,0)$, $(5,0)$ is Unit Length

(7 , $\sqrt{29}$, $3\frac{1}{2}$, 3)

4) In the corresponding figure :

The line equation is

($X = 1$, $Y = 1$, $Y = X$, $Y = -X$)



5) ABCD Parallelogram , the slope of $\overrightarrow{AB}$ equal the slope of

($\overrightarrow{AD}$, $\overrightarrow{AC}$, $\overrightarrow{BC}$, $\overrightarrow{DC}$)

6) The intersected part of the negative direction of Y-axis of the line

$3Y = 4X - 12$ equal unit length .

($\frac{3}{4}$, 3 , 4 , -4)

7) The slope of the perpendicular to the line which passing $(2,3)$, $(5,1)$ equal

.....

($\frac{3}{2}$, $\frac{2}{3}$, $\frac{-3}{2}$, $\frac{-2}{3}$)

8) The perimeter of the circle with center $(0,0)$ and passing through $(3,4)$ equal

..... unit length .

(5π , 10π , 25π , 7π)

- 9) The vertical length between $Y - 3 = 0$, $Y + 2 = 0$ equal
- (5 , 1 , 2 , 3)
- 10) If $\frac{-2}{3}, \frac{K}{2}$ are slopes of two parallel lines , then $K = \dots\dots\dots$
- ($\frac{-3}{4}$, $\frac{1}{3}$, $\frac{-4}{3}$, 3)
- 11) If M_1, M_2 are slopes of two perpendicular lines , then $M_1 \times M_2 = \dots\dots\dots$
- (-1 , 1 , 2 , Zero)
- 12) The distance between (3,4) and Y-axis = unit length .
- (5 , 3 , 4 , 7)
- 13) The line $Y - 2X - 5 = 0$ intersect of positive direction of Y-axis part which length = unit length .
- (2 , 5 , 7 , 10)
- 14) If $\overline{AB}$ is a diameter in a circle such that $A(-1,5)$, $B(3,1)$, then the center of this circle is
- ((2,6) , (1,3) , (4,-4) , (-4,4))
- 15) The slope of $\overrightarrow{AB} = \frac{1}{3}$, $\overrightarrow{AB} \perp \overrightarrow{CD}$, the slope of $\overrightarrow{CD} = \dots\dots\dots$
- ($\frac{1}{3}$, $-\frac{1}{3}$, 3 , -3)
- 16) The line equation which passing through (3,-2) and parallel to Y-axis is
- ($X = 3$, $Y = -2$, $X = -2$, $Y = 3$)
- 17) The slope of the line which parallel to Y-axis =
- (Zero , 1 , -1 , unknown)
- 18) The slope of the line $3X - 4Y + 12 = 0$ is
- ($\frac{3}{4}$, $\frac{-3}{4}$, $\frac{4}{3}$, $\frac{-4}{3}$)

- 19) The distance between (3,-4) and the X-axis equal Unit length .
 (-3 , 4 , -4 , 3)
- 20) If X-axis divided $\overline{AB}$ into two halves , A(3,2) and B(-2,Y) , then Y =
 (3 , 2 , -2 , 4)

Second : Essay exercises

- (1) ABCD quadrilateral shape , A(-1,1) , B(0,5) , C(5,6) , D(4,2) . Prove that ABCD is parallelogram .
- (2) Find the equation of the line which passing through (3,2) , (2,3) .
- (3) If the line which passing through (3,0) , (0,a) and the line $X - Y + 1 = 0$ are perpendicular , Find the value of a .
- (4) Prove that the triangle which vertex are A(1,-2) , B(-4,2) , C(1,6) is isosceles
- (5) ABCD rhombus its vertex are A(3,2) , B(4,-3) , C(-1,-2) , D(-2,3) , Find its surface area .
- (6) ABCD parallelogram , its diagonals are intersect in H such that , A(3,-1) , B(6,2) , C(1,7) , Find the coordinates of H and D .
- (7) Prove that A(-1,5) , B(1,2) , C(3,-1) are collinear .
- (8) Find the equation of the line which passing through (4,5) and parallel to $X - 2Y - 7 = 0$.
- (9) Find the type of the triangle LMN with respect to its sides such that L(-2,4) , M(3,-1) , N(4,5) .
- (10) Prove that A(3,-1) , B(-4,6) , C(2,-2) located on the circle which center is M(-1,2) and then find its perimeter .

- (11) Find the equation of the line which passing through (3,-5) and perpendicular to $X + 2Y - 7 = 0$.
- (12) Prove that the line which passing through (2,-1) , (6,3) is parallel to the line which make a positive angle 45° with the positive direction of X-axis .
- (13) If C(4,Y) is the midpoint of $\overline{AB}$ such that A(X,3) , B(6,5) , Find the value of X , Y .
- (14) Prove that the triangle which vertex A(4,3) , B(-3,2) , C(3,0) is a right angle triangle in C , and then find the coordinates of the vertex which make ABCD a rectangle .
- (15) Prove that the line which passing through A(3,1) , B(1,2) is parallel to the line $2X + 4Y - 3 = 0$.
- (16) If the triangle with vertex X(3,5) , Y(4,2) , Z(-5,A) is right angle triangle in Y , Find the value of A .
- (17) If the equations of the lines L_1 , L_2 respectively are $6X + kY - 3 = 0$, $2X - 3Y + 6 = 0$, Find the value of k which make the lines :
- 1- Parallel .
 - 2- Perpendicular .
- (18) If the distance between (a,7) , (0,3) equal 5 , Find the value of a .
- (19) ABC triangle , $\overline{AB} \perp \overline{BC}$, A(4,1) , B(-2,-1) , Find :
- 1- The slope of $\overrightarrow{AB}$.
 - 2- The equation of $\overrightarrow{BC}$.
- (20) $\overline{AD}$ is a median in $\triangle ABC$, M is a midpoint of $\overline{AD}$, M(0,6) , B(3,2) , C(-3,6)
Find the coordinates of the point A .

Test on unit five

- Choose the correct answer :

1) The line $2X - 3Y - 6 = 0$ intersect form the Y-axis part its length

(-6 , -2 , $\frac{2}{3}$, 2)

2) If $3X - 4Y - 3 = 0$, $kY + 4X - 8 = 0$ are perpendicular , then k =

(-4 , -3 , 3 , 4)

3) The area of Δ which specified by the lines $3X - 4Y = 12$, $X = 0$, $Y = 0$ equal

(6 , 7 , 12 , 5)

4) The lines $Y = 3X - 5$, $2Y = 6X + 5$ are

(parallel , intersect and not perpendicular , perpendicular , equivalent)

- Find the equation of the line which cut from x-axis and Y-axis two parts equal 4 , 6 units respectively .
- ABCD rhombus , A(1,3) , C(6,0) , Find the equation of the line $\overleftrightarrow{BD}$.
- ΔABC such that A(3,-1) , B(x,3) , C(5,3) is right angle triangle in A , Find x .
- If C(6,-4) is the midpoint of $\overline{AB}$ such that A(5,-3) , Find the coordinates of the point B .



Model tests on Geometry

- Choose the correct answer :

(1) ABCD parallelogram , the slope of $\overleftrightarrow{AB}$ equal the slope of

($\overleftrightarrow{AC}$, $\overleftrightarrow{AD}$, $\overleftrightarrow{BC}$, $\overleftrightarrow{DC}$)

(2) The length of the intersected part of the negative direction of Y-axis by the line $3Y = 4X - 12$ equal Unit length .

($\frac{4}{3}$, 3 , 4 , -4)

(3) The slope of the perpendicular to the line which passing through (2,3) , (5,1) equal

($\frac{3}{2}$, $\frac{2}{3}$, $\frac{-3}{2}$, $\frac{-2}{3}$)

(4) If X , Y are complementary angels , $\sin(X) = \frac{3}{5}$, then $\cos(Y) = \dots\dots\dots$

($\frac{4}{5}$, $\frac{3}{5}$, $\frac{3}{4}$, $\frac{5}{3}$)

(5) The perimeter of the circle with center (0,0) and passing through (3,4) equal unit length .

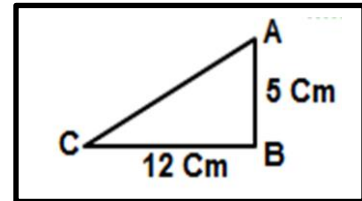
(5π , 10π , 25π , 7π)

(6) The slope of the line which make a positive angle H with the positive direction of X-axis equal

($\sin(H)$, $\cos(H)$, $\frac{\sin(H)}{\cos(H)}$, $\sin(H) + H$)

- (A) without using calculator , Prove that : $\tan^2(60) - \tan^2(45) = 4 \sin(30)$.
- (B) ABCD rhombus : A(3,2) , B(4,-3) , C(-1,-2) , D(-2,3) , Find its surface area .

(A) ABC right angle triangle in B , AB = 5 Cm , BC= 12 Cm , Find the value of :
 $\sin(C) + \cos(C)$.



(B) ABCD parallelogram , its diagonals intersect in H such that , A(3,-1) , B(6,2) , C(1,7) , Find the coordinates of H and D .

- (A) find the value of X : X is acute angle
 $\sin(X) = \sin(60)\cos(30) - \cos(60)\sin(30)$
- (B) prove that A(-1,5) , B(1,2) , C(3,-1) are collinear .
- (A) find the equation of the line which passing through (4,5) and parallel
 $X - 2Y - 7 = 0$.
- (B) find the type of $\triangle LMN$ with respect to its sides , L(-2,4) , M(3,-1) , N(4,5) .

Geometry Model

(1) Choose :

1) $\overline{CD}$

2) 4

3) $\frac{3}{2}$

4) $\frac{3}{5}$

5) 10π

6) $\frac{\sin H}{\cos H}$

(2) A)

$$\begin{array}{c} \text{L . H . S} \\ \tan^2(60) - \tan^2(45) = 2 \end{array}$$

$$\begin{array}{c} \text{R . H . S} \\ 4 \sin(30) = 2 \end{array}$$

B) $AC = \sqrt{(3 - -1)^2 + (2 - -2)^2} = 4\sqrt{2}$ L . Unit

$BD = \sqrt{(4 - -2)^2 + (-3 - 3)^2} = 6\sqrt{2}$ L . Unit

$\text{Area} = \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2} = 24$ Square Unit

(3) A) $\text{Acs } \sqrt{(12)^2 + (5)^2} = 13$ Cm

$\sin(C) = \frac{5}{13}$, $\cos(C) = \frac{12}{13}$

$\sin(C) + \cos(C) = \frac{5}{13} + \frac{12}{13} = \frac{17}{13}$

B) $H = (2, 3)$ $\therefore D = (-2, 4)$

(4) A) $x = 30$

B) $LM = 5\sqrt{2}$, $LN = \sqrt{37}$, $MN = \sqrt{37}$
 $\therefore \Delta$ is isosceles .

Geometry

Model (2)

- Choose the correct answer :

(1) In $\triangle ABC$, if $M(\widehat{A}) + M(\widehat{B}) = 110^\circ$, then $M(\widehat{C}) = \dots\dots\dots$

(110 , 90 , 70 , 50)

(2) $\tan(45) = \dots\dots\dots$

($\sqrt{3}$, $\frac{1}{\sqrt{3}}$, $\frac{1}{2}$, 1)

(3) ABCD square , then $M(\widehat{CAB}) = \dots\dots\dots$

(90 , 45 , 60 , 30)

(4) The vertical distance between the lines $Y - 3 = 0$, $Y + 2 = 0$ equal $\dots\dots\dots$

(5 , 1 , 2 , 3)

(5) The measure of the exterior angle from the vertex of the equilateral triangle equal $\dots\dots\dots$

(60 , 150 , 120 , 30)

(6) $\frac{-2}{3}$, $\frac{k}{2}$ are slopes of two parallel lines , then $k = \dots\dots\dots$

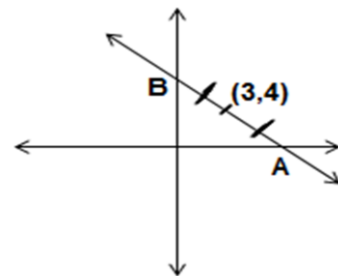
($\frac{-3}{4}$, $\frac{1}{3}$, 3 , $\frac{-4}{3}$)

- (A) without using calculator , Prove that :

$$\cos(60) = \cos^2(30) - \sin^2(30) .$$

(B) prove that A(3,-1) , B(-4,6) , C(2,-2) located on a circle with center M (-1,2) and then find the perimeter of this circle .

- (A) find the equation of the line which passing through (3 , -5) and perpendicular to the line $X + 2Y - 7 = 0$.
(B) Find the value of X : $4X = \cos^2(30)\tan^2(30)\tan^2(45)$
- (A) By using the slope , Prove that A(-1,3) , B(5,1) , C(6,4) , D(0,6) are vertex of rectangle .
(B) prove that the line which passing through (2,-1) , (6,3) is parallel to the line which make a positive angle 45° with the positive direction of X-axis .
- (A) ABC triangle , $AB = AC = 10$ Cm , $BC = 12$ Cm , drawn $\overrightarrow{AD} \perp \overline{BC}$
 $\overrightarrow{AD} \cap \overline{BC} = \{ D \}$
- Prove that : $\sin^2(C) + \cos^2(C) = 1$
(B) in the corresponding figure :
C (3,4) is the midpoint of $\overline{AB}$,
Find the perimeter of $\triangle CAB$.



Geometry

Model (3)

- Choose the correct answer :

- (1) If $L_1 // L_2$, $L_3 \perp L_1$, $L_4 \perp L_2$, then
($L_1 // L_2$, $L_1 // L_4$, $L_3 // L_4$, $L_4 \perp L_2$)
- (2) The vertical distance between the lines $Y + 1 = 0$, $Y + 3 = 0$ equal unit.
(4 , 2 , 1 , 5)
- (3) The points (0,0) , (3,0) , (0,4)
(make an obtuse angle triangle , make an acute angles triangle , make a right angle triangle , are collinear)
- (4) A circle with center (0,0) and its radius = 2 unit length , which point belong to this circle ?
((1,2) , (-2,1) , ($\sqrt{2}$,1) , ($\sqrt{3}$,1))
- (5) The slope of the line which make positive angle 45° with the positive direction of X-axis equal
(1 , -1 , Zero , 2)
- (6) In $\triangle ABC$,if $M(\hat{A}) = 85^\circ$, $\sin(B) = \cos(B)$, then $M(\hat{C}) = \dots\dots\dots$
(30° , 45° , 50° , 60°)
- (A) ABCD quadrant shape : A(2,4) , B(-3,0) , C(-7,5) , D(-2,9) , prove that ABCD is a square .
 - (B) prove that : $\cos^2(45^\circ) + \tan^2(60^\circ) - \sin(30^\circ) = 3$

- (A) Find the value of X , if $\sin(X) = \sin(60^\circ)\cos(30^\circ) - \cos(60^\circ)\sin(30^\circ)$

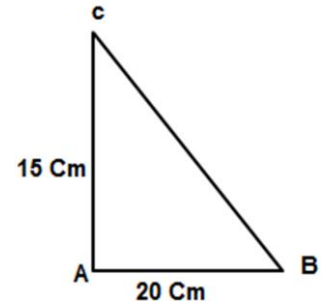
Such that : $0 < X < 90^\circ$

(B) Prove that $A(-2,5)$, $B(3,3)$, $C(-4,2)$ are not collinear .

- (A) in the corresponding figure :

ABC triangle , $M(\hat{A}) = 90^\circ$, $AC = 15 \text{ Cm}$, $AB = 20 \text{ Cm}$

Prove that : $\cos(C)\cos(B) - \sin(C)\sin(B) = \text{Zero}$.



(B) Find the equation of the line which passing through $(4,2)$, $(-2,-1)$, then prove that this line passing through the origin .

- (A) if $A(X,3)$, $B(3,2)$, $C(5,1)$, and $AB = BC$, then find the value of X .

(B) the equations of L_1 , L_2 are respectively $2X - 3Y + 1 = 0$, $3X + bY - 6 = 0$

Then find the value of b if :

1- $L_1 \parallel L_2$.

2- $L_1 \perp L_2$.

Geometry

Model (4)

- Choose the correct answer :

(1) If $\sin(2X) = 0.5$, X is acute angle , then $m(\hat{X}) = \dots\dots\dots^\circ$

(70 , 60 , 15 , 30)

(2) M_1 , M_2 are the slopes of two perpendicular lines , then $M_1 \times M_2 = \dots\dots\dots$

(-1 , 1 , 2 , Zero)

(3) If $m(\hat{B}) = 90^\circ$, $m(\hat{A}) = 60^\circ$, $AC = 20$ Cm . , then $AB = \dots\dots\dots$

(20 , 10 , 20 , 5)

(4) The distance between (3,4) and the Y-axis is $\dots\dots\dots$ unit length .

(5 , 3 , 4 , 7)

(5) The line $Y - 2X - 5 = 0$, cut from the positive direction of Y-axis part its length $\dots\dots\dots$ unit length .

(2 , 5 , 7 , 10)

(6) If (3,6) satisfy the relationship $Y = kX$, then $k = \dots\dots\dots$

(12 , 9 , 3 , 1)

- (A) find the equation of line with slope $\frac{2}{3}$ and passing through $(-3, 7)$

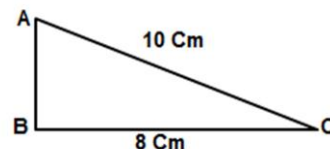
(B) prove that $4\sin(30) + \tan^2(45) = \tan^2(60)$, without using the calculator .

- (A) if $C(4,y)$ is the midpoint of $\overline{AB}$: $A(x,3)$, $B(6,5)$, find the value of x, y .

(B) in the corresponding figure :

$\triangle ABC$ is right angle triangle in B

, $AC = 10$ Cm , $CB = 8$ Cm .



Find : 1- the length of $\overline{AB}$ 2- $\sin(C)\cos(A) + \sin(A)\cos(C)$

- (A) prove that the line which passing through $(4,3)$, $(0,2)$ is parallel to the line which make angle 45 with positive direction of X-axis .
- (B) prove that Δ which vertex $A(1,1)$, $B(0,4)$, $C(-1,1)$ is isosceles .
- (A) find the equation of the line which passing through $(3,4)$ and perpendicular to the line $5X - 2Y + 7 = 0$.
- (B) ABCD rectangle , $AB = 5$ Cm , $BC = 12$ Cm .

Find :

1 - $M(\hat{ACB})$

2 - $2 \tan(\hat{ACB}) \tan(\hat{BAC})$.